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Citation for published version:
Sturdy, S 2007, 'Scientific Method for Medical Practitioners: The Case Method of Teaching Pathology in Early Twentieth-Century Edinburgh', *Bulletin of the History of Medicine*, vol. 81, no. 4, pp. 760-792. https://doi.org/10.1353/bhm.2007.0093

Digital Object Identifier (DOI):
10.1353/bhm.2007.0093

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Publisher's PDF, also known as Version of record

Published In:
Bulletin of the History of Medicine

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Download date: 05. May. 2023

Scientific Method for Medical Practitioners: The Case Method of Teaching Pathology in Early Twentieth-Century Edinburgh

STEVE STURDY

SUMMARY: The appointment of James Lorrain Smith as first full-time professor of pathology at the University of Edinburgh in 1912 led to a series of reforms in pathology teaching there. Most significant was the inception of what Lorrain Smith called the "case method of teaching pathology," which used the investigation of clinical cases as the basis for a series of exercises in clinico-pathological correlation. This paper examines the social and cognitive organization of the case method of teaching, and shows how such exercises were expected to inform the students' future medical training and practice. In so doing, it also throws light on the relationship between medical science and clinical practice that obtained in Edinburgh at that time.

KEYWORDS: medical education, pathology, clinical cases, Edinburgh

The research for this paper was partially supported by a Wellcome Trust Project Grant in the History of Medicine, jointly held with Mike Barfoot and Chris Lawrence. I greatly benefited from Mike's and Chris's encouragement and advice throughout this project, and from their discussions of earlier drafts of this paper. Early versions of this paper were presented at the Centre for the History of Science, Technology and Medicine, University of Manchester, 22 November 2005; the Centre for the History of Medicine, University of Glasgow, 8 December 2005; the annual conference of the History of Science Society, Vancouver, 2–5 November 2006; and the workshop on "Cultures of 'Evidence'/Contexts of 'Truth,'" Wellcome Trust Centre for the History of Medicine, University College London, 23–24 November 2006. I would like to thank the participants in these meetings for their questions and feedback. I am particularly grateful to Stella Butler, Jonathan Harwood, Malcolm Nicolson, Elizabeth Toon, Mick Worboys, and three anonymous referees for the *Bulletin* for their perceptive and constructive criticisms and suggestions.

In 1912, James Lorrain Smith was appointed professor of pathology at the University of Edinburgh—the first person to hold that chair on a full-time basis. His arrival marked an important moment in medical teaching in Edinburgh. Formerly, the chair of pathology had been occupied part-time by a practicing clinician, who also taught clinical medicine in the Royal Infirmary of Edinburgh. Over the next few years, Lorrain Smith would initiate a number of changes in the medical curriculum, and particularly in the teaching of pathology to medical students, that tell us much about how he and his Edinburgh colleagues envisaged the relationship between the pursuit of science and the practice of medicine. In particular, they make clear exactly how the Edinburgh medical teachers supposed that the science and practice of pathology should best inform medical practice and cognition. In this paper I examine Lorrain Smith's pedagogical innovations, to throw light on an aspect of the history of scientific medicine—namely, the aims and methods of teaching pathology to prospective medical practitioners—that has received little attention from historians.

Pathology in Late Nineteenth-Century Edinburgh

The Edinburgh medical school had long prided itself on offering a distinctly scientific preparation for medical practice—an approach that the Edinburgh teachers were keen to distinguish from what they portrayed as narrowly empirical practical training offered by the London hospital schools. But just what was meant by a scientific approach to medicine was changing rapidly by the middle of the nineteenth century.[1]

Throughout much of the eighteenth century and the first half of the nineteenth, Edinburgh's claim to teach a peculiarly scientific form of medicine had rested in part on the school's reputation for excellence in what were called the "institutes of medicine," a course intended to provide students with a grasp of the general principles underlying medical practice. In Edinburgh, those principles meant a thorough understanding of normal physiology, plus an appreciation of how physiological processes could be perverted or disrupted in disease, and how they could be

1. The most detailed analyses of the contested meanings of science in mid- to late nineteenth-century medicine have been conducted by John Harley Warner, working on the American context: Warner, "The Fall and Rise of Professional Mystery: Epistemology, Authority and the Emergence of Laboratory Medicine in Nineteenth-Century America," in *The Laboratory Revolution in Medicine*, ed. Andrew Cunningham and Perry Williams (Cambridge: Cambridge University Press, 1992), pp. 110–41; Warner, "Ideals of Science and Their Discontents in Late Nineteenth-Century American Medicine," *Isis,* 1991, *82*: 454–78.

restored or redirected by various kinds of therapeutic intervention.[2] The institutes of medicine offered scientific principles and explanations of the kinds of phenomena that the practitioner might encounter in the clinic. This clinical orientation was reinforced by the institutional arrangements for the subject: the university chair of the institutes of medicine was a part-time position, held by professors who also taught and practiced clinical medicine on the wards of the Royal Infirmary, and who made much of their living from private practice.[3]

During the last third of the nineteenth century, however, following the lead set by the German universities, physiology in Britain had increasingly come to be seen as a separate scientific discipline, to be taught by full-time career scientists rather than part-time clinicians, and characterized by a distinct academic culture and a jealous pursuit of its autonomous disciplinary goals.[4] Edinburgh had quickly taken steps to assert its own position in the vanguard of this new movement, turning the part-time chair of the institutes of medicine into a full-time chair of physiology in 1874.

2. L. S. Jacyna, "Theory of Medicine, Science of Life: The Place of Physiology in the Edinburgh Medical Curriculum, 1790–1870," in *The History of Medical Education in Britain*, ed. Vivian Nutton and Roy Porter (Amsterdam: Rodopi, 1995), pp. 141–52. The precise role of physiological science, and especially of laboratory investigations, in clinical practice was becoming controversial by the 1850s: see John Harley Warner, "Therapeutic Explanation and the Edinburgh Bloodletting Controversy: Two Perspectives on the Medical Meaning of Science in the Mid-Nineteenth Century," *Med. Hist.*, 1980, *24*: 241–58. But this should not obscure the fact that Edinburgh clinicians generally considered a physiological understanding of health and disease to be vital for effective practice.

3. From 1751 the university professors of medicine, including the professor of the institutes of medicine, were granted the privilege of offering clinical lectures at certain times of the year in the wards, using patients set aside for that purpose. Over the course of the nineteenth century these privileges evolved, partly through changes of statute and partly through changes in accepted practice, such that by the end of the century each professor of medicine effectively had a set number of wards allocated to him. Though these professors were not officially physicians to the infirmary, by the late 1870s they were treated as such under the Infirmary Regulations. See Royal Infirmary of Edinburgh, "Notes and Excerpts from the Minutes, &c., as to the Relationship of the University and the Royal Colleges of Physicians and of Surgeons to the Institution, 1728–1900," LHB1/42/4/(2), Lothian Health Services Archive, Edinburgh University Library (hereafter EUL), Edinburgh.

4. On the establishment of physiology as a scientific discipline in Britain, see Gerald L. Geison, *Michael Foster and the Cambridge School of Physiology: The Scientific Enterprise in Late Victorian Society* (Princeton: Princeton University Press, 1978); Stella V. F. Butler, "Centers and Peripheries: The Development of British Physiology, 1870–1914," *J. Hist. Biol.*, 1988, *21*: 473–500. On the international context see, inter alia, Gerald L. Geison, ed., *Physiology in the American Context, 1850–1940* (Bethesda, Md.: American Physiological Society, 1987); William Coleman and Frederic L. Holmes, eds., *The Investigative Enterprise: Experimental Physiology in Nineteenth-Century Medicine* (Berkeley: University of California Press, 1988).

The Edinburgh physiology professors increasingly distanced themselves from any claims to engage with the concerns of medical practice; their subject was to be understood, not as the principles of medical practice, but as the science of normal biological function.[5]

Consequently, Edinburgh's claims to offer a peculiarly scientific approach to medical practice had come increasingly to rest on the teaching of pathology. The university had done much to reinforce its reputation in this area in 1881, when it appointed William Smith Greenfield—an accomplished pathological anatomist, and a pioneer in the new experimental science of bacteriology—to the chair of pathology.[6] Under Greenfield's leadership, classroom teaching was reorganized to reflect the latest developments in pathological science.[7] In addition, he continued to com-

5. William Rutherford, Edinburgh's first full-time professor of physiology, was a transitional figure who saw physiology as an independent research-led discipline, but continued to teach it in a way that stressed its relevance to the understanding of disease: Stewart Richards, "Conan Doyle's 'Challenger' Unchampioned: William Rutherford F.R.S. (1839–99), and the Origins of Practical Physiology in Britain," *Notes & Rec. Roy. Soc. London*, 1986, *40*: 193–217; S. W. Sturdy, "A Co-ordinated Whole: The Life and Work of John Scott Haldane" (Ph.D. thesis, University of Edinburgh, 1987), pp. 96–97. With the appointment of Edward Schäfer (later Sharpey-Schäfer) to the Edinburgh chair of physiology in 1899, these remaining links between physiology and clinical medicine were sharply severed. Schäfer was a keen advocate of physiology as a "basic" preclinical science, and his early years in Edinburgh were dominated by his efforts to build up an "institute" incorporating experimental physiology, chemical physiology, and histology, and by a campaign to clarify the distinction between the preclinical and clinical sections of the curriculum: see University of Edinburgh, Faculty of Medicine, minutes of meetings, 1900–1902, passim, EUL, Department of Special Collections (hereafter DSC), shelf ref. DA43. Thereafter he seems to have played little part in the activities of the Faculty, and by the early 1920s his extreme isolationism marked him out, even to advocates of academic scientific independence, as an obstructive rather than a progressive influence within the school: see Richard Pearce, "Notes of R.M.P. on Medical School of the University of Edinburgh, 22–24 February 1923," p. 5, folder 5, box 1, series 405, RG 1.1, Rockefeller Foundation Archives, Rockefeller Archive Center (hereafter RAC), Sleepy Hollow, N.Y. See also Merriley Borell, "Setting the Standards for a New Science: Edward Schäfer and Endocrinology," *Med. Hist.*, 1978, *22*: 282–90.

6. Greenfield had previously served as demonstrator and then lecturer in morbid anatomy and pathology at St Thomas's Hospital, London, from 1874, then from 1878 as professor of pathology at the University of London's Brown Animal Institution, a pioneering physiological and pathological research laboratory. While at the Brown Institution, he had conducted research into the bacteriology of anthrax, including developing a method to reduce the virulence of the bacillus that partly anticipated Pasteur's more celebrated work. See obituary, "William Smith Greenfield," *Brit. Med. J.*, 1919, *2*: 255–58; H. R., obituary, "Professor W. S. Greenfield," *Edinburgh Med. J.*, 1919, n.s., *23*: 258–62.

7. Greenfield's lectures in "general pathology" included discussion of the germ theory as well as various other physiological and chemical disease processes, while those in "special pathology" aimed to show how an understanding of those processes served to explain the

bine part-time teaching in pathology with clinical teaching and practice in the Royal Infirmary, where his clinical lectures concentrated on the practice of diagnosis. For many students, it was this clinical instruction that proved to be the highlight of Greenfield's teaching.[8] During his time in the Edinburgh chair, however, Greenfield's reputation as one of the leading pathology teachers in Britain came to be overshadowed. By the early 1900s, pathology, like physiology before it, was increasingly coming to be regarded as an occupation in its own right, with full-time posts in a growing number of British medical schools.[9] In 1906, the Pathological Society of Great Britain and Ireland was established as a deliberate alternative to the clinician-dominated Pathological Society of London, with the purpose of advancing the status of pathology as "a branch of science with

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phenomena of disease as observed in human subjects: Notes of Pathology lectures by W. S. Greenfield, 1888–89, EUL, DSC, shelf ref. Dk.4.10. He also inaugurated a practical class in pathological histology, which showed how these processes were manifested in changes in the microscopic structures of the tissues: H. R., "Professor W. S. Greenfield" (n. 6), pp. 259–60.

8. H. R., "Professor W. S. Greenfield" (n. 6), p. 258.

9. The first full-time chair in pathology was established at the University of Cambridge in 1884. After a fierce contest between those who favored a style of pathology that concentrated chiefly on autopsies and pathological histology, and those who favored a more biological approach to research, the chair was awarded to the German-trained physiological pathologist C. S. Roy: Mark W. Weatherall, *Gentlemen, Scientists and Doctors: Medicine at Cambridge 1800–1940* (Woodbridge: Boydell Press, 2000), pp. 135–40. Thereafter, full-time chairs were established in Manchester in 1891, Liverpool in 1894, St Andrews in 1898, and Glasgow and Birmingham in 1899. The remaining provincial university medical schools followed in quick succession. The London teaching hospitals, being only rather tenuously affiliated with the University of London before 1900, and rather reluctantly thereafter, were slow to appoint professors; but St Bartholomew's hospital appointed a full-time lecturer in pathology in 1893, and the other teaching hospitals followed suit: George J. Cunningham, *The History of British Pathology* (Bristol: White Tree Press, 1992). As with physiology, the model for the growth of pathology as a full-time science was initially established in Germany in the mid-century. Compared with physiology, the development of pathology as a scientific discipline—albeit one with strong clinical connections—has received surprisingly little attention from historians, but see, inter alia, Russell C. Maulitz, "Rudolph Virchow, Julius Cohnheim, and the Program of Pathology," *Bull. Hist. Med.*, 1978, *52*: 162–82; Maulitz, "Pathology," in *The Education of American Physicians: Historical Essays*, ed. Ronald L. Numbers (Berkeley: University of California Press, 1980); Maulitz, "The Pathological Tradition," in *Companion Encyclopedia to the History of Medicine*, ed. W. F. Bynum and Roy Porter, vol. 1 (London: Routledge, 1993), pp. 169–91; Edward T. Morman, "Clinical Pathology in America, 1865–1915: Philadelphia as a Test Case," *Bull. Hist. Med.*, 1984, *58*: 198–214; and the essays in *Pathology in the Nineteenth and Twentieth Centuries: The Relationship Between Theory and Practice*, ed. Cay-Rüdiger Prüll in collaboration with John Woodward (Sheffield: European Association for the History of Medicine and Health Publications, 1998).

a defined place, distinct from the clinical arts."[10] By 1912, when Greenfield retired, Edinburgh was one of the few leading British medical schools still to possess a part-time chair of pathology.[11]

In transforming the chair of pathology to a full-time post and appointing James Lorrain Smith to fill it, the university secured the services of one of the foremost advocates of the new disciplinary approach to pathology. Lorrain Smith had initially studied medicine in Edinburgh—including pathology under Greenfield—during the 1880s; he had set his sights on a career as a full-time scientist, however, and following his graduation in 1889 had followed this course with single-minded determination. In 1894 he was appointed lecturer in pathology in the Queen's University, Belfast, converting this post to a full-time professorship in 1901. In 1904 he moved on to the full-time chair of pathology at the University of Manchester. While there, he also played a leading role in the establishment of the Pathological Society.[12] His recruitment to the Edinburgh chair effectively signaled the university's endorsement of the new movement in pathological science.

Pathology and Clinical Medicine

Lorrain Smith took the opportunity afforded by his inaugural lecture to reiterate the aims of that movement. In recent years, he told his audience, pathology had "developed in various directions, much in the same way as has happened in physiology—by the application of the exact methods of physics and chemistry, and it is due to this that pathology no longer remains in the obscurity of being an appendage to medicine."[13] Consequently, pathology now had a legitimate claim to be regarded as "an independent science which gives its own description and interpretation of disease."[14]

10. J. Henry Dible, "A History of the Pathological Society of Great Britain and Ireland," *J. Pathol. Bacteriol.*, 1957, *73*: 1–35, quoting from p. 2. The new Society was not without support from at least some among the clinical elite, including William Osler and Clifford Allbutt, Regius Professors of Medicine at the Universities of Oxford and Cambridge, respectively.

11. University College London was even slower than Edinburgh, not creating a full-time professorship until 1915: W. R. Merrington, *University College Hospital and Its Medical School: A History* (London: Heinemann, 1976), p. 220.

12. J. S. Haldane, "James Lorrain Smith," *Proc. Roy. Soc. London*, B, 1931–32, *109*: iv–ix; R. M. [probably Robert Muir], "James Lorrain Smith 1862–1931," *J. Pathol. Bacteriol.*, 1931, *34*: 683–96; J. W. Crerar, obituary, "James Lorrain Smith," *Edinburgh Med. J.*, 1931, *38*: 387–91.

13. J. Lorrain Smith, "The Place of Pathology in the Medical Curriculum. Inaugural Lecture Delivered on 9th October 1912," *Edinburgh Med. J.*, 1912, n.s., *9*: 391–99, at p. 394.

14. Ibid., pp. 396–97.

Unlike some of his fellow pathologists, however, Lorrain Smith did not seek a complete divorce from the concerns of clinical medicine, on the model of physiology:[15] he regarded the investigation and elucidation of the clinical manifestations of disease as one of the goals of pathology, and urged collaboration with clinical colleagues. Thus, in a case of disease, neither the observations and insights adduced by the clinician, nor those made by the pathologist, should take priority. Agreement, stressed Lorrain Smith, was "the aim before each investigator, and until they agree there remains an irritating dissatisfaction which goads the observers into further inquiry and research. The pathologist and the clinician cannot do without each other."[16] Pathologist and clinician should aim to arrive at a single, mutually satisfactory account of the case that drew on their respective skills and expertise and met their respective criteria of scientific and clinical adequacy.

Lorrain Smith's own activities in Edinburgh exemplified such collaboration. For one thing, he was eager to negotiate a new relationship between the pathological activities of the university and those of the Royal Infirmary. In the mid-nineteenth century, the infirmary had established its own pathology department to conduct postmortem and other investigations on behalf of the clinical staff. It was initially staffed by junior physicians, who saw it as a stepping stone to more senior appointments as consultant physicians, but by the early twentieth century many of those who worked there looked instead for full-time careers as scientists.[17] Despite some movement of staff between the infirmary and university pathology depart-

15. E.g., A. E. Boycott, who succeeded Lorrain Smith in the Manchester chair. Where the latter had negotiated an agreement that the professor of pathology should be ex officio honorary pathologist to the Manchester Royal Infirmary, Boycott "maintained that a professor of pathology in a University must devote all his energies to its advancement as a science and that the application of laboratory methods to clinical medicine was not part of his duty"; when he moved on to become the first full-time professor of pathology at University College London in 1914, "the same divergence in view as to the proper duties and responsibilities of a professor of pathology again rose to disturb the otherwise complete harmony between Boycott and clinical colleagues" (C. J. Martin, "Arthur Edwin Boycott 1877–1938," *Obit. Not. Fell. Roy. Soc. London*, 1936–38, *2*: 561–71, at pp. 563–64.

16. Lorrain Smith, "Place of Pathology" (n. 13), p. 393.

17. On the establishment of the post of pathologist to the infirmary, and the careers of the early incumbents, see A. Logan Turner, *Story of a Great Hospital: The Royal Infirmary of Edinburgh 1729–1929* (Edinburgh: Oliver and Boyd, 1937), pp. 170–72. A list of the pathologists and assistant pathologists is provided in ibid., pp. 377–79. Several of the later nineteenth- and early twentieth-century pathologists went on to occupy chairs of pathology in universities around Britain and the Empire. It was also increasingly common for these aspiring professional pathologists to combine work in the infirmary department with junior teaching positions in the university.

ments, however, the two had remained quite separate. Nor had Lorrain Smith's predecessors sought any official role in the infirmary's pathological work. This says much about the status of pathology within the hospital: the actual conduct of pathological investigations was mere service work, subordinate to the real medical work of diagnosing and treating patients and best delegated to junior members of staff.

By contrast, Lorrain Smith did not have responsibility for beds or patients in the infirmary—nor did he seek it, committed as he was to a full-time career in science. Instead, he sought control of the infirmary's pathology department. Shortly after he arrived in Edinburgh, the infirmary agreed that the university professor of pathology should be appointed ex officio pathologist to the infirmary, with day-to-day responsibility for the postmortem and other investigative work undertaken in the hospital.[18] In many respects, clinical pathology was still a service role[19]—but in entrusting that role to a university professor rather than a junior physician, the infirmary acknowledged that pathology, including clinical pathology, was now a distinct field of expertise best cultivated by professional scientists of high academic standing. In his new capacity, Lorrain Smith was also granted some of the privileges of a full physician or surgeon to the infirmary—including, most importantly, the authority to make use of any materials that came to the postmortem room for his own research and teaching purposes.[20]

Lorrain Smith's position as pathologist to the infirmary was greatly enhanced by the fact that the infirmary and university were at that time entering a period of much more active and harmonious cooperation than

18. University of Edinburgh, Faculty of Medicine, minutes of meetings of 15 and 18 October 1912, EUL, DSC, shelf ref. DA43; "Agreement between the University Court and the Managers of the Royal Infirmary regarding clinical arrangements and pathology," 20 and 23 June 1913, University of Edinburgh Archives, Secretary's File, DRT 95/002, part 1, Faculty of Medicine, box 5. The agreement included a proviso that the professor of pathology would be appointed pathologist to the Infirmary "subject to the Board of Managers being satisfied that he is able to undertake and discharge the duties of the post"; it also specified that the current infirmary pathologist, Theodore Shennan, should remain in post until such time as he chose to move on, Lorrain Smith meanwhile serving as consultant pathologist. In the event, Shennan was appointed to the chair of pathology at the University of Aberdeen in 1914, at which point Lorrain Smith assumed the post of pathologist. See Turner, *Story of a Great Hospital* (n. 17), pp. 310, 378.

19. "Agreement" (n. 18).

20. Ibid. It is worth noting that, shortly after his appointment, Lorrain Smith was elected a Fellow of the Royal College of Physicians of Edinburgh—an honor usually reserved for senior clinicians. He quickly came to play an active role in the life of the College: W. S. Craig, *History of the Royal College of Physicians of Edinburgh* (Oxford: Blackwell Scientific, 1976), pp. 709, 736.

had been the case for some time. By about 1910, competition for students between the university professors and the ordinary medical and surgical staff of the infirmary—who had long taught medical students on an extramural basis—had come to be seen as detrimental to the medical education offered in the Edinburgh school.[21] Consequently, the city's various medical institutions embarked on a program of what Christopher Lawrence has called "modernization," with a view to enhancing Edinburgh's attractiveness as a center of medical education.[22] In 1913, the university and the infirmary agreed that the nonprofessorial clinical staff of the infirmary should be permitted to teach and examine for the university degrees as well as the diplomas of the Royal Colleges, while the university should in turn be given greater say in the appointment of the infirmary staff.[23]

Meanwhile, steps were also taken to enhance the academic and scientific character of the Edinburgh medical curriculum. Because the third-year curriculum formed a hinge between the classroom-based scientific instruction of the first two years and the clinical teaching of the last two years, it was in this part of the curriculum that reformers sought to better connect scientific and clinical learning. In particular, Lorrain Smith and others focused on the third-year courses in pathology and pharmacology:[24]

21. A. Logan Turner, *Sir William Turner, K.C.B., F.R.S.* (Edinburgh: Blackwood, 1919), pp. 393–401. Initially, the infirmary staff had been permitted to teach only for the diplomas of the Royal Colleges and other corporate licensing bodies. However, the most successful of these extramural teachers were also able to attract significant numbers of degree students, who supplemented the professorial teaching required by the university curriculum with extramural classes where these were deemed superior to what was on offer within the university. The competition between professorial and extramural teachers was if anything increased rather than diminished by regulations established by the Commissioners appointed under the Universities of Scotland Act of 1889, permitting students studying for the degree to take up to two of the five years of medical study, or half the subjects of the curriculum, with teachers outside the university.

22. C. J. Lawrence, *Rockefeller Money, the Laboratory and Medicine in Edinburgh 1919–1930: New Science in an Old Country* (Rochester, N.Y.: Rochester University Press, 2005), pp. 71–79.

23. "Agreement" (n. 18). Under this agreement, control over appointments as assistant physician or assistant surgeon to the infirmary passed from the entire Board of Management of the infirmary to a selection committee comprising two of the university representatives on that board, one of the representatives of each of Edinburgh's two Royal Colleges, and three additional nominees of the board. This committee then selected two candidates from those seeking admission to the infirmary staff, and passed their names to the entire board to make the final selection.

24. The structure of the medical curriculum just prior to Lorrain Smith's assumption of the chair is outlined in *Edinburgh University Calendar 1911–1912* (Edinburgh: Thin, 1911).

> In collaboration with his professorial colleagues, and with the authority of the Faculty, Lorrain Smith got the subjects of the third year—namely, pathology, pharmacology and therapeutics, junior medicine and junior surgery—intimately linked, so that, in place of an imperfect patchwork stitched together by the tyro himself, the varying occurrences in the course and progress of disease were unfolded to him in natural sequence.[25]

Lorrain Smith also introduced a number of innovations into the pathology course itself. The course lasted throughout the third year of the curriculum, including a course of lectures in "general and special pathology" that spanned all three terms. Lorrain Smith and his colleagues updated the lectures, adding bacteriological topics.[26] They also extended the practical teaching to include sixty hours of "systematic study of morbid histology" and twenty hours of practical bacteriology "during which the student studies the cultural and microscopic characters of the ordinary disease-producing bacteria."[27] Increased emphasis was thus placed on teaching the latest scientific methods for studying the processes and causes of disease.

25. R. M., "James Lorrain Smith" (n. 12), p. 692. It is an acknowledgment of the leading role that Lorrain Smith played in organizing the curriculum, and of his colleagues' willingness for him to take that role, that he was elected dean of the Faculty of Medicine in 1919: ibid.

26. Brief outlines of the form and content of the pathology course can be found in *Edinburgh University Calendar 1914–1915* (Edinburgh: Thin, 1914), pp. 515, 554–56; and in James Ritchie, "Memorandum with regard to the Teaching of Pathology and Bacteriology in the University of Edinburgh," 27 April 1922, folder 7315 ("Medical Education by Abraham Flexner—Scotland 1922–24"), box 713, series 1.5, General Education Board Archives, RAC. The bacteriology teaching was overseen by Ritchie, who was appointed to a new chair of bacteriology in 1913. Ritchie had graduated in medicine at Edinburgh one year before Lorrain Smith. Like the latter, he went on to Oxford in 1889, initially as assistant to a successful local general practitioner. Shortly after arriving in Oxford he began conducting bacteriological research in the university medical school under the Regius professor of medicine, Sir Henry Acland. From 1896 he taught pathology and bacteriology; he was officially appointed to a lectureship in 1897 and to a personal chair in 1905. In 1907 he returned to Edinburgh as superintendent of the Laboratory of the Royal College of Physicians of Edinburgh—at that time one of the most productive medical science laboratories in the Scottish capital, despite much of the work being undertaken by medical practitioners in their spare time; he retained the superintendency when he was appointed university professor of bacteriology, only giving it up in 1919 to concentrate solely on his university duties. Like Lorrain Smith, he seems to have been respected by the local clinical élite, and in 1910 he was elected a Fellow of the Royal College of Physicians of Edinburgh. See Robert Muir, "James Ritchie," *J. Pathol. Bacteriol.*, 1923, *26*: 137–44; J. Lorrain Smith, "James Ritchie," *Edinburgh Med. J.*, 1923, *30*: 124–27. On the work of the Laboratory of the Royal College of Physicians of Edinburgh, see Steve Sturdy, "Knowing Cases: Biomedicine in Edinburgh, 1887–1920," *Soc. Stud. Sci.*, 2006, *37*: 659–89.

27. Ritchie, "Memorandum" (n. 26).

In addition, Lorrain Smith introduced a further course of practical instruction in "morbid and applied pathology," which effectively provided an introduction to the clinical aspects of pathology. The first section of this course involved practical instruction in performing autopsies, investigating organs and tissues using gross anatomical and histological methods, and "drawing up reports" on the findings of such investigations.[28] But the most notable innovation in the pathology teaching came in the second half of this practical course, which was devoted to what Lorrain Smith called the "case method" of teaching pathology.[29] This section of the course was particularly important in showing students how morbid pathology should inform the practice of medicine itself, and in training them to think and practice accordingly. As such, it warrants especially close analysis.

The Case Method of Teaching Pathology

The study of clinical cases had long served to demonstrate the significance of pathology for clinical practice. With the development of pathological anatomy, most notably in the Paris school of medicine during the early nineteenth century, and the conviction that much, if not all, disease could be attributed to specific lesions in the tissues of the body, the pathological investigation of clinical cases came to be central both to demonstrating the truth of that conviction and to showing how clinical investigation and cognition should accordingly be reoriented. By correlating clinical signs and symptoms with pathological changes in the tissues observed at postmortem examination, clinicians and pathologists were able to identify specific disease entities, and to redefine diagnosis as the task of identifying the diseases manifested by each patient.[30] With the subsequent adop-

28. *Edinburgh University Calendar 1914–1915* (n. 26), p. 516.

29. Lorrain Smith had begun to develop this method of teaching while at Manchester, but it became the centerpiece of his pathology course during his time in Edinburgh: R. M., "James Lorrain Smith" (n. 12), p. 685; Crerar, "James Lorrain Smith" (n. 12), p. 389. Lorrain Smith's activities in Manchester are briefly discussed in Helen K. Valier, "The Politics of Scientific Medicine in Manchester, c. 1900–1960" (Ph.D. thesis, University of Manchester, 2002), pp. 77–82.

30. Russell C. Maulitz, "In the Clinic: Framing Disease at the Paris Hospital," *Ann. Sci.*, 1990, *47*: 127–37; L. S. Jacyna, "Au lit des malades: A. F. Chomel's Clinic at the Charité, 1828–9," *Med. Hist.*, 1989, *33*: 420–49. For the background to these practices, see Russell C. Maulitz, *Morbid Appearances: The Anatomy of Pathology in the Early Nineteenth Century* (Cambridge: Cambridge University Press, 1987). This redefinition of disease necessitated a reciprocal retuning of the clinician's senses. See Jens Lachmund, "Making Sense of Sound:

tion, following the work of Rudolf Virchow, of the view that pathology was often located at the level of cellular processes, histological as well as gross anatomical methods also came to play an increasingly important role in the definition and identification of disease. But the basic logic of clinicopathological correlation remained constant: signs and symptoms observed in the clinic were correlated with the results of postmortem pathological investigation as a means both of defining general diagnostic categories and of confirming or refining diagnoses made on clinical grounds.[31]

Meanwhile, the demonstration of such methods became a central element in medical education. Students followed clinicians as they examined patients on the wards of the teaching hospitals, and they observed the postmortem investigations conducted on those patients when they died. By such means, students learned both the clinical practice of diagnosis and the habit of seeing diagnosis in terms of the pathological lesions and processes that were understood to be the basis of disease. Such methods dominated clinical pedagogy in late nineteenth-century Edinburgh as in other European medical schools of that time, most obviously in Greenfield's course on clinical diagnosis and in the autopsies performed on many of the cases that figured in that course.

Lorrain Smith's "case method" of teaching pathology plainly built on these earlier precedents, in that it used clinical cases as a basis for teaching, and made extensive use of pathological anatomy and histology to uncover the disease processes taking place in those cases. That is not to say that the course ignored the latest developments in pathological science. As we shall see, the way that Lorrain Smith and his colleagues interpreted the results of anatomical and histological investigation of clinical

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Auscultation and Lung Sound Codification in Nineteenth-Century French and German Medicine," *Sci. Technol. & Hum. Val.*, 1999, *24*: 419–50; Lachmund, "Between Scrutiny and Treatment: Physical Diagnosis and the Restructuring of Nineteenth Century Medical Practice," *Sociol. Health & Illness*, 1998, *20*: 779–801.

31. Cay-Rüdiger Prüll, "Pathology and Surgery in London and Berlin 1800–1930: Pathological Theory and Clinical Practice," in Prüll, *Pathology* (n. 9), pp. 71–99. It might be noted that, within the British context, Edinburgh and Edinburgh-trained physicians were unusually receptive both to the Parisian approach to pathological anatomy and to a histological view of normal and pathological processes. On pathological anatomy, see Maulitz, *Morbid Appearances* (n. 30), pp. 143–46; Malcolm Nicolson, "The Introduction of Percussion and Stethoscopy to Early Nineteenth-Century Edinburgh," in *Medicine and the Five Senses*, ed. W. F. Bynum and Roy Porter (Cambridge: Cambridge University Press, 1993), pp. 134–53. On cellular approaches to physiology and pathology in Edinburgh, see L. S. Jacyna, "'A Host of Experienced Microscopists': The Establishment of Histology in Nineteenth-Century Edinburgh," *Bull. Hist. Med.*, 2001, *75*: 225–53.

cases differed subtly from that of most late nineteenth-century pathologists, reflecting the recent turn to a more physiological understanding of pathological processes, to which Lorrain Smith himself had contributed. The course also made use of new laboratory approaches to pathological investigation, including not just the latest histological techniques but also bacteriological and chemical tests. However, the course did not so much replace existing methods of pathological science as develop and extend them in keeping with the evolution of pathology more generally. Where Lorrain Smith's teaching departed most markedly from earlier methods of case-based instruction was in the intellectual, practical, and social organization of the classes. He and his colleagues published a series of reports on seven cases they had used in the course that publicized his teaching method to the medical community, and that offer us valuable details about his pedagogy. Here we can see how he imagined the "independent and equal" relationship between science and clinical practice.[32]

Students taking the morbid and applied pathology course studied a total of six cases over a period of eighteen weeks.[33] But the way they encountered these cases was distinctly novel: neither as living patients nor as dead bodies, but as collections of records and other material traces that were brought together in the pathology classroom some time after the patient's death. For each case, students were given a variety of sources of clinical and pathological information, including "a typewritten account of the case, giving the clinical history, an account of the post-mortem examination, and a discussion of the post-mortem findings in the light of the clinical observations, with especial reference to the origin of the

32. J. Lorrain Smith, "Studies from the Pathological Department of the University of Edinburgh. Introduction," *Edinburgh Med. J.*, 1915, n.s., *14*: 5; A. Murray Drennan, "Studies from the Pathological Department of the University of Edinburgh. Case I: Case of Carcinoma of the Pylorus, Old Obstruction in Left Coronary Artery, with Organised Infarct of Heart Wall and Aneurysm Formation. Recent Pulmonary Thrombosis," ibid., pp. 6–14; J. Lorrain Smith, "Case II: Case of Tuberculosis of the Bronchial and Mesenteric Glands, followed by General Tuberculosis," ibid., pp. 112–17; J. Lorrain Smith, "Case III: Case of Tuberculosis Involving the Hip Joint, Bronchial Glands, Lungs, and Intestines," ibid., pp. 199–204; James Ritchie, "Case IV: Pulmonary and Intestinal Tuberculosis with Tuberculous Empyema, Tuberculous Septicæmia, and Terminal Intestinal Hæmorrhage," ibid., pp. 367–75; D. Murray Lyon, "Case V: Case of Osteomyelitis with Pyæmia," ibid., 1915, n.s., *15*: 18–28; James Miller, "Case VI: Case of Myxœdema," ibid., pp. 253–60; T. Y. Finlay and A. Murray Drennan, "Case VII: Clinical Observations on a Case of Hæmophilia," ibid., 1916, n.s., *16*: 425–43.

33. Lorrain Smith, "Studies from the Pathological Department" (n. 32), p. 5. Ritchie, writing seven years later, stated that the course "extends over two terms (about 21 weeks in all)": Ritchie, "Memorandum" (n. 26); it is not clear if this figure of 21 weeks represented an increase in the time devoted to the course or (as is more likely) included the three-week Easter vacation.

disease and its development"; they were also presented with "a series of jars containing all the affected organs, and a series of microscopic preparations from the same."[34]

According to Lorrain Smith, the range of sources was intended to be as comprehensive as possible, "on the principle that the case is to be considered as a whole."[35] It is important to understand what he meant by "as a whole." Formerly, students had been introduced to different aspects of the cases they studied in a sequence of stages: observing them first clinically, as patients on the hospital wards, and then pathologically, some time later, in the autopsy room. Only at this later stage were the students able to follow the results of a full pathological examination, and to appreciate how the results of that examination might cast light on their earlier clinical observations. By contrast, students taking the morbid and applied pathology course were introduced to the clinical and pathological aspects of the case simultaneously rather than consecutively. The case method of teaching pathology effectively collapsed the sequence of clinical and pathological observations into a single pedagogical moment, in which the results of pathological investigation immediately assumed equal importance with the clinical observations.

On being introduced to the various sources, the class engaged in a brief preliminary discussion of the case. The students were then expected to pursue their own studies of the case, including undertaking such additional reading as they saw fit.[36] Outside the scheduled class times the pathology classrooms, including the various records and specimens, remained "open for students working whenever they have leisure."[37] Students might also be directed to other comparable or contrasting cases recorded in the Infirmary Day Book, or to other specimens preserved in the pathology museum.[38] They were expected to "prepare a full account

34. Ritchie, "Memorandum" (n. 26).

35. Lorrain Smith, "Studies from the Pathological Department" (n. 32), p. 5.

36. David L. Edsall, "Comparative Observations of Methods of Education in Clinical Medicine in Great Britain and the United States, 1922–23" (typescript), p. 29, folder 217, box 16, series 401, RG 1.1, Rockefeller Foundation Archives, RAC.

37. Ritchie, "Memorandum" (n. 26).

38. See, e.g., Drennan, "Case I" (n. 32), p. 12. The use of pathology museums for teaching purposes deserves more attention. Their increasing importance as teaching resources during the late nineteenth and early twentieth centuries is noted by Jonathan Reinarz, "The Age of Museum Medicine: The Rise and Fall of the Medical Museum at Birmingham's School of Medicine," *Soc. Hist. Med.*, 2005, *18*: 419–37. This chronology is confirmed by the history of the Pathological Museum of the Royal College of Surgeons of Edinburgh, which languished during the mid-nineteenth century but revived as a site of teaching and research from the 1880s: Helen M. Dingwall, *"A Famous and Flourishing Society": The History of the Royal College*

of the naked-eye and microscopic characters of the specimens, and, in a review of the case, discuss the post-mortem findings in relation to the clinical history."[39] They were encouraged to work collaboratively, although their write-ups of the cases were assessed individually.[40]

From the beginning, then, the students were expected to see each case as representing a particular "clinico-pathological situation," and they received feedback from staff on their ability to achieve such a clinico-pathological point of view, both orally in class and in their written reports on the selected cases. Taught in this way, Lorrain Smith declared, pathology provided "an introduction to clinical work to an extent that is impossible where the student is restricted to the more abstract questions of morbid anatomy"; in consequence, the student's "general interest in pathology as a branch of medicine becomes the more living."[41] The intention was that this living pathological interest would carry over into the student's clinical studies on the wards of the infirmary, and that the pathology course would provide an effective bridge between the studies of disease in the laboratory that characterized the preclinical sections of the curriculum and the study of actual cases of disease that was central to the clinical teaching.

The case method of teaching also exemplified the kind of cooperative relationship that Lorrain Smith envisaged should exist between pathologist and clinician. His appointment as pathologist to the infirmary gave him free use of such pathological materials as passed through his department there, and he doubtless took advantage of these privileges. However, unlike the physical materials, the clinical notes and other patient records remained the property of the infirmary; consequently, Lorrain Smith needed permission to use such records in his teaching. Permission was generally granted by the attending clinicians,[42] but clinical cooperation

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of Surgeons of Edinburgh, 1505–2005 (Edinburgh: Edinburgh University Press, 2005), pp. 201–2. For a brief consideration of the pedagogical intentions behind such use, including the importance of linking specimens with case notes, see Steve Sturdy, "Making Sense in the Pathology Museum," in *Anatomy Acts: How We Come to Know Ourselves*, ed. Andrew Patrizio and Dawn Kemp (Edinburgh: Birlinn, 2006), pp. 107–15.

39. Ritchie, "Memorandum" (n. 26).

40. Edsall, "Comparative Observations" (n. 36), p. 29; Ritchie, "Memorandum" (n. 26). See also *Edinburgh University Calendar 1914–1915* (n. 26), p. 516.

41. Lorrain Smith, "Studies from the Pathological Department" (n. 32), p. 5.

42. In the exemplary cases selected for publication, the authors thanked the attending physicians and surgeons for providing the clinical notes to be used in teaching. Harold Stiles, surgeon to the Royal Hospital for Sick Children and soon to become Regius Professor of clinical surgery at the University of Edinburgh, provided the notes for Drennan's "Case I: Case of Carcinoma" (n. 32), and contributed a general discussion of the pathology and

went considerably further. According to one observer: "In the preliminary discussion [of each case] the pathologist, bacteriologist, clinician, and sometimes others interested, are brought into the general discussion."[43] The case method of teaching thus literally enacted just the kind of collegial and dialogical relationship between clinicians and pathologists, and between their respective forms of skill and expertise, that Lorrain Smith argued was essential for the practice of pathology itself.

Knowing Cases

The exemplary cases published in the *Edinburgh Medical Journal* also show us what the student was expected to learn from the case method of teaching pathology. The case history, records of the physical examination, and progress notes provided an account of the "clinical facts" of each case, while "the post-mortem examination and the subsequent microscopical study of the affected organs give an account of the sequence of events as it is portrayed in the pathological lesions"; by comparing and correlating these two sets of records the student was expected to construct a single narrative of the pathological events as they occurred in the case at hand, "with the purpose of bringing out clearly the relation of clinical symptoms with pathological changes."[44] The case method thus aimed to teach students the skills of clinico-pathological correlation. The Edinburgh method of teaching pathology sought not so much to revolutionize or replace existing approaches to clinico-pathological correlation, as to bring them up to date with the latest developments in both pathological and clinical science.

Earlier approaches to clinico-pathological correlation tended to revolve, in practice if not in precept, around classificatory and diagnostic concerns. Paris-school pathological anatomy had centered on the natural-

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treatment of tuberculosis to the write-up of Lorrain Smith's "Case II: Case of Tuberculosis." John Thomson, physician to the Royal Edinburgh Hospital for Sick Children, attended Lorrain Smith's "Case III: Case of Tuberculosis." Harry Rainy, physician to the Royal Infirmary, provided Ritchie's "Case IV: Pulmonary and Intestinal Tuberculosis." David Wilkie, assistant surgeon to the Royal Infirmary and later professor of surgery at the university, was the attending surgeon for Murray Lyon's "Case V: Case of Osteomyelitis with Pyæmia." Thomas Lovell Gulland, professor of medicine at the university and physician to the Royal Infirmary, attended Miller's "Case VI: Case of Myxœdema," and Gulland and Alexander Miles, surgeon to the Royal Infirmary, were responsible for Finlay and Drennan's "Case VII: A Case of Hæmophilia."

43. Edsall, "Comparative Observations" (n. 36), p. 29.

44. Lorrain Smith, "Studies from the Pathological Department" (n. 32), p. 5.

historical project of identifying the specific bodily lesions that defined particular disease entities.[45] Virchow's refocusing of pathology from gross anatomical lesions to cellular processes introduced a further dimension of discrimination and precision into this process. But despite Virchow's programmatic claims that the new cellular pathology provided for a more dynamic understanding of disease, in practice it would appear that the diagnostic imperative implicit in much nineteenth-century clinical practice ensured that morbid pathology, including the practice of clinico-pathological correlation, continued to revolve around the identification of particular disease entities.[46] Late nineteenth-century pathological case histories, as much as their earlier nineteenth-century antecedents, generally moved from a discussion of the clinical history to an account of the underlying pathology—albeit now a dynamic as much as a topographical one—in such a way as effectively to write out any idiosyncrasy from the clinical narrative.[47] The abiding concern was still with the identification of typical rather than singular cases.

45. Michel Foucault, *The Birth of the Clinic: An Archaelogy of Medical Perception*, trans. A. M. Sheridan (London: Routledge, 1973), esp. chap. 8: "Open Up a Few Corpses"; Maulitz, "In the Clinic" (n. 30).

46. This diagnostic imperative is implicit, for instance, in the innovations in clinical histopathology discussed in L. S. Jacyna, "The Laboratory and the Clinic: The Impact of Pathology on Surgical Diagnosis in the Glasgow Western Infirmary, 1875–1910," *Bull. Hist. Med.*, 1988, *62*: 384–406. Christian Bonah attributes the dominance of pathological anatomy and the failure of pathological physiology in late nineteenth- and early twentieth-century German physiology to a continuing concern with the demands of clinical diagnosis: "Pathological Anatomy versus Pathological Physiology: A Franco-German Dispute over a 'Province for Pathology,'" in Prüll, *Pathology* (n. 9), pp. 31–53. Russell Maulitz adduces similar reasons for the stillbirth of physiological pathology in twentieth-century America: "Pathologists, Clinicians, and the Role of Pathophysiology," in Geison, *Physiology in the American Context* (n. 4), pp. 209–35.

47. For a detailed study of the work of constructing novel neurological disease entities from clinico-pathological case histories, and the continuance of primarily classificatory concerns throughout the nineteenth century, see L. S. Jacyna, *Lost Words: Narratives of Language and the Brain, 1825–1926* (Princeton: Princeton University Press, 2000). That clinical narratives were themselves progressively denuded of individuating features in the course of the nineteenth century, in part owing to the growing systematization of pathological categories around which those narratives could be standardized, is of course a commonplace of a growing literature on the literary construction of case histories. See, e.g., Kathryn Montgomery Hunter, *Doctors' Stories: The Narrative Structure of Medical Knowledge* (Princeton: Princeton University Press, 1991); Julia Epstein, *Altered Conditions: Disease, Medicine and Storytelling* (New York: Routledge, 1995); Harriet Nowell-Smith, "Nineteenth-Century Narrative Case Histories: An Inquiry into Stylistics and History," *Can. Bull. Med. Hist.*, 1995, *12*: 47–67. The implication is that the pathological systematization of disease categories in turn provided a basis for disciplining the construction of clinical histories.

By the closing decades of the nineteenth century, however, some authorities were beginning to call for a more dynamic perception not only of the pathological processes that gave rise to disease, but also of the clinical manifestations of those processes.[48] In Edinburgh from the 1890s onward, clinicians and laboratory scientists working together in the Laboratory of the Royal College of Physicians of Edinburgh published a steady flow of case histories that used accounts of pathological processes as a basis not for writing out but for reinterpreting the narrative presented by the clinical history.[49] Through the construction of such clinico-pathological narratives—as distinct from the static diagnostic and classificatory forms of clinico-pathological correlation that had gone before—morbid pathology began to serve a more hermeneutic and individuating purpose than had previously been the case.

Lorrain Smith's own approach to pathology was in keeping with this new concern to attend to the dynamics of disease in its clinical as well as its pathological aspect. Indeed, one of his obituarists saw this is a corollary of his pathophysiological insistence that disease should be regarded as "a vital *process* and not as a *state*":

> It necessarily followed that the pathologist, like the clinician, must study the body as a whole in relation to abnormal function and abnormal reaction and not as a collocation of separate organs, and that no investigation of a diseased condition could be complete which was divorced from the clinical history of the case.[50]

The implication is that the clinical history was of value to the pathologist because it captured temporal aspects of the disease process that were less readily accessible through pathological and especially postmortem

48. Harry M. Marks, "'Until the Sun of Science . . . the True Apollo of Medicine Has Risen': Collective Investigation in Britain and America, 1880–1910," *Med. Hist.*, 2006, *50*: 147–66, at pp. 150–52; the quotation in the title is from James Paget, "Some Rare and New Diseases" (1882), quoted at ibid., p. 152. Paget and his colleagues sought to understand the dynamics of disease in terms of the interaction between innate constitutional predispositions and such "accidents" as habit, environment, and infection. Such an understanding, declared Paget, would require "a much more complete and exact study of all the personal conditions of disease than is now usual" (ibid., p. 151).

49. Sturdy, "Knowing Cases" (n. 26). Pedro Laín Entralgo identified a more general tendency toward the construction of such narratives in later nineteenth-century pathophysiological studies of cases, in *La historia clínica: Historia y teoría del relato patográfico* (Madrid: Consejo Superior de Investigaciones Cientificas, 1950), chap. 6: "La historia clínica en el siglo XIX." Though writing from a rather progressivist and universalizing perspective, Laín nonetheless makes clear that the London and Edinburgh clinicians were not unique in their search for a more dynamic approach to pathological knowledge of cases.

50. Crerar, "James Lorrain Smith" (n. 12), p. 389.

investigation.[51] This attention to the clinical history as well as the results of pathological investigation was central to Lorrain Smith's case method of teaching pathology, as can be seen in the cases published in the *Edinburgh Medical Journal*.

In a case of tuberculosis, for instance, postmortem histological examination provided a means of reconstructing the course of the disease within the body, starting with the pathogen's first point of entry and the establishment of an initial nidus of infection, then tracing the spread of that infection into other nearby tissues, and finally following its passage into the blood and its fatal dissemination to more-remote organs. These different stages in the spread of the infection were then correlated with the stages in the progress of the disease as experienced by the patient and observed by the doctors, from first symptoms to hospitalization and death.[52] In a case of myxedema, pathological and especially histological investigation served to reveal the sequence of degenerative changes—including arteriosclerosis, which in turn had damaged the kidneys by compromising their nutrition—that were held accountable for the early clinical manifestations of illness, the particular nature of the patient's decline, and ultimately her death.[53] In both cases, the pathological narrative—in the first case, charting the course of an infection, and in the second, describing a series of pathophysiological causes and effects—was integrated with the clinical history to produce a single, coherent clinico-pathological story.

The events in this clinico-pathological narrative could be pinpointed with greater precision and confidence in some cases than in others. Considering a case of "osteomyelitis with pyæmia," for instance, it was noted that a particular clinical event, namely a "sudden fall in the amount of urine secreted after the 16th December . . . probably indicates the date of [a particular pathological event, namely] the onset of nephritis" as revealed by postmortem examination of the kidneys.[54] Looking back over the history of another case of tuberculosis, however, the pathologist was

51. This view resonates with the comments of William Gull, who joined Paget in calling for collective research by general practitioners into the biographical aspects of disease. According to Gull: "It is his [i.e., the general practitioner's] privilege to see the earliest beginnings of disease, and to have the opportunity of tracing its evolution and decline. . . . the steps of pathological progress are before him, whereas at the end of life when the whole organism crushes downwards into a chaos of pathological forms it is often impossible on the postmortem table to say where the failure began and how it has advanced" (William Gull, "An Address on the International Collective Investigation of Disease," *Brit. Med. J.*, 1884, *2*: 305–8, at p. 306, quoted in Marks, "'Until the Sun of Science'" [n. 48], p. 151).

52. Lorrain Smith, "Case II" (n. 32).

53. Miller, "Case VI" (n. 32).

54. Murray Lyon, "Case V" (n. 32), p. 28.

more cautious. Pathological reconstruction of the course of the disease indicated that it had progressed at some point from a local to a more systemic infection; clinical records gave only a vague indication of when that progression might have occurred, however: "The only date which can be given in connection with this period [of the spread of disease] is that of the commencement of hip-joint symptoms in March 1912, or eleven months before death."[55] But chronological precision was less important than the way that clinical and pathological observation served to illuminate and give meaning to one another, so as to enrich both the clinician's and the pathologist's understanding of a case.

This hermeneutic purpose went well beyond any concern merely with diagnosis, at least in the sense of assigning cases to specific diagnostic categories. Indeed, in every one of the published cases, the diagnosis had already been uncontentiously established on clinical grounds long before any additional pathological examinations were conducted; in one case—that of myxedema—the diagnosis had been made and treatment begun some ten years before the patient was admitted to the hospital with her final illness.[56] In no instance were the pathological findings seen to challenge or refine the clinical diagnosis; rather, the aim was to show how a pathological perspective could serve to enrich the understanding of the peculiarities of the case at hand. In this respect, it is significant that the course in applied and morbid pathology should include both "outstanding and typical cases" of disease.[57]

In fact, most of the cases published in the *Edinburgh Medical Journal* were considered to be more or less "typical" of particular kinds of disease, in that they illustrated certain "characteristic" clinical features of those diseases. Thus the case of myxodema discussed above was presented as in many respects "typical . . . both as to the clinical features and the pathological findings," including the characteristic age of onset and the fact that the patient was female.[58] In a case of tuberculosis, the author observed that "the characteristic of tuberculosis in the child as compared with the adult is its tendency to spread and rapidly develop in generalized form. This condition is well exemplified in the present case."[59] Characteristic diagnostic signs might also be pointed out—for instance, the pathognomonic "leather bottle stomach" in a case of stomach cancer.[60]

55. Lorrain Smith, "Case III" (n. 32), p. 203.
56. Miller, "Case VI" (n. 32), p. 253.
57. Lorrain Smith, "Studies from the Pathological Department" (n. 32), p. 5.
58. Miller, "Case VI" (n. 32), p. 259.
59. Lorrain Smith, "Case II" (n. 32), p. 117.
60. Drennan, "Case I" (n. 32), p. 13.

Even in typical cases, however, the aim of pathological examination was to see beyond the clinical signs and symptoms, and to develop a fuller understanding of the pathological processes that accounted for the developing clinical picture. The case of stomach cancer, for example, served to illustrate a feature of the etiology of cancer in general: "It should be remembered that gastric carcinomas may be super-imposed on a chronic gastric ulcer," observed the author; but the superimposition of cancer on preexisting lesions was not peculiar to ulcers of the stomach: "also chronic ulcers of the tongue, lips, legs, etc., may become malignant, illustrating the fact that there is a relationship between chronic irritation and the onset of cancer."[61] The case of pyemia likewise illustrated a more general pathological process, namely: "the susceptibility of tissues, *devitalised by prolonged toxæmia*, to the attack of organisms to which they were formerly immune."[62] Thus, pathological details offered insights into the unfolding of disease processes within the body.

This appreciation of the pathological processes underlying disease also provided a means of thinking about atypical aspects of the case history. Thus the same case of myxedema that we have just seen discussed for its typical features also served to illustrate certain unusual developments: "Arteriosclerosis of the atheromatous type is common in cases of myxœdema, but in this particular instance it was a more than usually marked feature," and indeed was judged to have been ultimately responsible for the patient's death.[63] Postmortem examination of the otherwise typical case of stomach cancer mentioned above revealed that, in addition, the patient had suffered from an unrelated heart condition that had not been clinically diagnosed, but that was retrospectively identified as the cause of death. This case was "of much interest" for showing how a chance combination of pathological conditions could lead to unexpected clinical outcomes.[64] The aim was not merely to assimilate cases to more general diagnostic categories, but also to comprehend the unclassifiable peculiarities and idiosyncrasies that individual cases might often exhibit.

Finally, the case method of teaching pathology also served to demonstrate something of the range of scientific techniques and methodologies that might be employed to investigate such phenomena. The well-established techniques of pathological anatomy and pathological histology figured large in all the cases selected for publication in the *Edinburgh Medical Journal*, but newer laboratory methods were also employed

61. Ibid.
62. Murray Lyon, "Case V" (n. 32), p. 28 (emphasis in original).
63. Miller, "Case VI" (n. 32), p. 260.
64. Drennan, "Case I" (n. 32), p. 10.

to throw light on pathological processes. Most notably, bacteriological investigations were employed in several of the cases.[65] Again, these were not used for diagnostic purposes—though diagnostic bacteriology was in increasingly common use at that time, not least in the pathological department of the Royal Infirmary under Lorrain Smith's supervision[66]—but rather as a means of illuminating the processes of infection and resistance that helped to explain the course and outcome of particular cases of disease.

Other relatively new scientific methods of pathological investigation could also be employed in the clinic as a means of observing pathological processes while the patient was still alive. Thus in a case of pyemia, precise measurement of the amount of urine produced played an important part in the clinical observations, as did a record of the fluctuations in the patient's temperature; the clinical chart, including a graph of temperature as well as daily figures for urine production and other clinical observations, was reproduced in the published account of the case.[67] In exceptional cases, more complex laboratory techniques might also be employed, for instance to study the effects of novel forms of treatment. A case of hemophilia was treated with horse serum, which some clinicians had suggested might replace whatever clotting agents were lacking in hemophiliacs.[68] The effects of treatment were monitored using a lengthy series of estimations of blood coagulation time, conducted by Addis's

65. Postmortem isolation and culture of tubercle bacilli was reported in Ritchie, "Case IV" (n. 32), p. 370; while staphylococci were isolated from the case discussed in Murray Lyon, "Case V" (n. 32), p. 24.

66. Charles J. Smith, *Edinburgh's Contribution to Medical Microbiology* (Glasgow: Wellcome Unit of the History of Medicine, University of Glasgow, 1994), pp. 134–35. Bacteriological tests were in frequent use by the early 1920s, including Wassermann tests in practically any case where the symptoms might potentially be attributable to syphilis: see Lawrence, *Rockefeller Money* (n. 22), pp. 188, 271–72. By that time, the university pathology course also included a practical course in clinical bacteriology, consisting of about ten two-hour classes, which mirrored Lorrain Smith's case method of teaching in key respects. The course included practical exercises on material sent in for examination to "three clinical laboratories in connection with the School. Each day one or two specimens which have been sent in to these laboratories are given out to the class with a statement of the clinical condition from which the specimen has been derived and of the object with which the specimen was sent in. The students then proceed to apply the appropriate methods and draw up a report of their findings. At the end of the course an account of the work done is handed in and criticised and handed back to the student" (Ritchie, "Memorandum" [n. 26]).

67. Murray Lyon, "Case V" (n. 32), p. 19. On the adoption of clinical charts in hospitals around this time, see Joel D. Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (Baltimore: Johns Hopkins University Press, 1995), pp. 51–56.

68. Finlay and Drennan, "Case VII" (n. 32).

method—a very recent technique that involved specialized apparatus and demanded considerable technical skill on the part of the investigator.[69] The results indicated that in this case the treatment was almost entirely ineffective when administered intravenously, but had a limited effect when given orally.[70]

The exemplary cases published in the *Edinburgh Medical Journal* thus make clear that the case method of teaching pathology was intended to train students not just to make pathologically informed diagnoses, but to construct comprehensive clinico-pathological narratives of the cases under consideration. Oriented toward understanding both atypical and typical cases of disease, the case method illustrated how an understanding of the underlying processes of disease, illuminated not only by postmortem examination but also by up-to-date laboratory methods for investigating pathological and physiological processes in the living, could help to explain the particular sequence of events observed by the clinician at the bedside.

Disciplining Clinical Perception

In terms of pedagogy, the case method of teaching pathology had much in common with the kinds of practical teaching that had been introduced into other areas of preclinical science during the latter half of the nineteenth century. The growth of laboratory-based teaching was driven by an expectation that students should not simply be taught the content of scientific knowledge—the end products of knowledge production, as it were—but also something of how that knowledge was produced. By conducting exemplary practical exercises under the disciplinary supervision of their teachers, students thus began to acquire not only the practical skills appropriate to the work of scientific knowledge production, but

69. Thomas Addis, "The Coagulation Time of the Blood in Man," *Quart. J. Exp. Physiol.*, 1908, *1*: 305–34. Addis developed this method while conducting research toward an M.D. degree in the University of Edinburgh's Department of Physiology. The method was considered to be significantly more accurate than more commonly used techniques, but was too cumbersome for routine clinical use. Addis went on to conduct pioneering research into the chemical pathology of hemophilia, including a study with Finlay, coauthor of the case currently under discussion. See F. Boulton, "Thomas Addis (1881–1949): Scottish Pioneer in Haemophilia Research," *J. Roy. Coll. Physicians Edinburgh*, 2003, *33*: 135–42.

70. Finlay and Drennan, "Case VII" (n. 32), pp. 429–34. In this instance, the account of these investigations conducted during life played a more prominent part in the presentation of the case than did the postmortem examination, which was simply appended to the case report without further comment or analysis: ibid., pp. 441–43.

also the epistemic and other values that defined what actually counted as scientific knowledge.[71] In effect, they began to learn, not just what kinds of techniques were employed to solve scientific puzzles, but also what a properly formulated puzzle-solution should look like.[72]

Lorrain Smith's case method of teaching pathology provided just such an introduction to the work of scientific knowledge production in the field of clinical pathology. As we have seen, the method revolved around the investigation of a number of exemplary cases, preselected for the lessons they offered about what to see in a case. The way those cases were discussed in the pathology classroom, the way the students were expected to compile their own accounts of the cases, and the feedback they received on those accounts provided the means of disciplining students' perceptions and ways of thinking, and of training them to produce what the teaching staff considered to be the right kind of solutions to the puzzles that those cases represented.

Moreover, the puzzle-solving skills that the students acquired on the course were intended to have a more general applicability. While the students were expected to give "special attention" to unraveling and writing up the six selected cases that formed the core of the teaching, they were "also required to prepare reports of this type on cases as they occur in the post-mortem room, and this forms a large part of [their] work in practical pathology."[73] Under their teachers' corrective supervision, they were thus expected to develop at least a basic understanding of how to set about investigating and explaining practically any case that passed through the postmortem room. On the basis of only six cases, the course could hardly expect to turn out fully competent clinical pathologists—but it was plainly intended to provide a sense of what such competence involved.[74]

Most historians have seen scientific pedagogy as predominantly oriented toward the production and reproduction of scientific research

71. On laboratory training in physiology, see Merriley Borell, "Instruments and an Independent Physiology: The Harvard Physiological Laboratory, 1871–1906," in Geison, *Physiology* (n. 4), pp. 293–321. Kathryn Olesko traces the roots of this pedagogy of disciplined practice to the philosophy seminars taught in early nineteenth-century German universities: "Commentary: On Institutes, Investigations, and Scientific Training," in Coleman and Holmes, *Investigative Enterprise* (n. 4), pp. 295–332.

72. Andrew Warwick and David Kaiser, "Conclusion: Kuhn, Foucault, and the Power of Pedagogy," in *Pedagogy and the Practice of Science: Historical and Contemporary Perspectives*, ed. David Kaiser (Cambridge: MIT Press, 2005), pp. 393–409.

73. Lorrain Smith, "Studies from the Pathological Department" (n. 32), p. 5.

74. Lorrain Smith, "Place of Pathology" (n. 13), p. 397.

schools and disciplines.[75] Such could hardly have been the principal aim of the case method of teaching pathology, however. While a handful of those who took Lorrain Smith's course on morbid and applied pathology went on to full-time careers in pathology, the vast majority were destined to become medical practitioners;[76] for these students, laboratory training in pathology served as part of their preparation, not for research, but for medical practice.[77]

The course taught students to correlate clinical observations with pathological information gleaned chiefly from postmortem investigation. As medical practitioners, however, they would be dealing with live patients, without access to postmortem information. But that did not mean that doctors were unable to construct clinico-pathological narratives about their patients: it just meant that, so long as the patient survived, any such narrative would have to be hypothetical, since the pathological aspect of the story could only be inferred, not observed. And such a narrative, though hypothetical, could still be useful. The ability to think critically about the kinds of pathological processes that might correspond to the signs and symptoms observed in the clinic provided a critical frame of reference for assessing the meaning of those signs and symptoms. As Lorrain Smith put it in his inaugural lecture: "The perfect clinical observer examining a patient must have in his mind's eye a picture of the struc-

75. See, e.g., the papers in *Research Schools: Historical Reappraisals*, ed. Gerald L. Geison and Frederic L. Holmes, *Osiris*, 1993, *8*, and esp. Kathryn M. Olesko, "Tacit Knowledge and School Formation," pp. 16–29. Thomas Kuhn early recognized this aspect of scientific research training: see T. S. Kuhn, "Second Thoughts on Paradigms," in *The Essential Tension: Selected Studies in Scientific Tradition and Change*, ed. Kuhn (Chicago: University of Chicago Press, 1977), pp. 293–319, at pp. 306–7.

76. The Edinburgh medical school was still a major producer of medical practitioners during the early twentieth century, second only to London in terms of the numbers produced, though the English provincial universities were quickly catching up. In the academic year 1909–10, 1,369 medical students matriculated at the university: John Dixon Comrie, "The Faculty of Medicine," in *History of the University of Edinburgh 1883–1933*, ed. A. Logan Turner (London: Oliver and Boyd, 1933), pp. 100–163, at p. 101; assuming that they were evenly distributed across the five years of the curriculum, that would mean 274 students per year passing through the pathology class. For an analysis of the careers of medical students who studied at Edinburgh and Glasgow in the years around 1871, see Anne Crowther and Marguerite Dupree, "The Invisible General Practitioner: The Careers of Scottish Medical Students in the Late Nineteenth Century," *Bull. Hist. Med.*, 1996, *70*: 387–413. No comparable analysis is available for the period considered in the present paper.

77. Cf. William H. Brock, "Breeding Chemists in Giessen," *Ambix*, 2003, *50*: 25–70: Brock observes that the great majority of the students who trained in Justus Liebig's famous chemical "research school" were bound for careers other than research, and considers how the practical skills they acquired might have assisted them in other forms of scientific work.

tural changes which have occurred in the body and which have led to the development of the symptoms. Without this his knowledge is, above all, formless and vague."[78] With its emphasis on clinico-pathological correlation, the course in morbid and applied pathology was intended to train the "mind's eye" to see through the clinical symptoms to imagine the pathological changes that might account for them.

Pathology as the Basis of Medical "Method"

Lorrain Smith was not the only member of the Edinburgh medical school to see pathology as an important means of disciplining and directing clinical perception. Many within the school regarded pathology as one of the foundations of what they called "method"—a concept that recurs repeatedly in the language of Edinburgh medicine during the early twentieth century. Method included the methods (plural) of clinical examination. The Edinburgh medical teachers had long been concerned that their students should be taught not only the techniques of clinical examination, but also how to apply those techniques in a systematic manner to ensure that all relevant signs and symptoms were noted.[79] Edinburgh teachers had also recognized the value of pathology as a means of informing and guiding such methods, as for instance in the clinical instruction offered by William Sanders, Greenfield's predecessor in the chair of pathology, which included a particular emphasis on clinical methods.[80] The same concern can also be discerned in the clinical teaching offered by William Russell, University Professor of Clinical Medicine from 1913, and one of those who contributed to the modernization of the medical curriculum around this time. He had himself served as pathologist to the Royal Infirmary before becoming a physician in his own right, and his experience of pathology was widely seen to inform his clinical teaching. As one obituarist noted, "Russell's work was characterised and influenced by his knowledge of pathology. He was a master of the methods of clinical medicine."[81]

78. Lorrain Smith, "Place of Pathology" (n. 13), p. 393.

79. Harry Rainy, physician to the Royal Infirmary and a popular Edinburgh clinical teacher, was coauthor of the most successful textbook of clinical examination to be published in Britain during the late nineteenth century: Robert Hutchison and Harry Rainy, *Clinical Methods: A Guide to the Practical Study of Medicine* (London: Cassell, 1897), which continues to be updated and published as *Hutchison's Clinical Methods*, ed. Michael Swash, 21st ed. (Edinburgh: Saunders, 2002). Hutchison was a London clinician.

80. William R. Sanders, "Method of Examining and Recording Medical Cases," *Edinburgh Med. J.*, 1873, *19*: 429–38.

81. Obituary, "William Russell," *Edinburgh Med. J.*, 1940, *47*: 704–5; the quote continues: "and his opinion of a case was much more likely to be determined by the findings of his

But "method" (singular) meant more than just the methods of clinical examination. An editorial published in the *Edinburgh Medical Journal* in 1913, just as Lorrain Smith and his colleagues set about reorganizing the teaching of pathology, explained:

> The first task of the apprentice is to learn how to use his tools. This is as true of clinical medicine as of any other craft, and although the two years of his apprenticeship [i.e., of clinical training] cannot turn the student into an accomplished physician, they ought at least to send him out with a thorough mastery of *method*. Possessed of this he requires only experience to excel in his profession; without it he is very likely to fall a victim to rule of thumb.[82]

"Method," thus construed, was more than just the systematic application of the techniques of clinical examination. It also implied a particular frame of mind, over and above any mere body of knowledge and technique, that the authors of the article were concerned should be instilled into the students passing through the Edinburgh medical school.

The importance of method was that it equipped practitioners to continue learning after graduation. It did so, moreover, by safeguarding against "rule of thumb" thinking. "Rule of thumb" was a common bugbear of medical educationalists around this time, and figured frequently in debates over how best to organize medical teaching to ensure that students—particularly the less-accomplished students who went on to become general practitioners—were as well prepared as possible to deal with the unforeseeable exigencies of medical practice. "Rule of thumb" denoted a merely mechanical form of reasoning from particular clinical signs and symptoms to particular diseases and treatments. "Method" implied a more critical evaluation of the clinical picture that enabled

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eyes, ears and fingers, than by the reports of chemists and electricians." This should not be taken to mean that Russell was uncritically hostile to the role of laboratory methods in medicine, however; he had undertaken extensive laboratory studies on a diversity of topics, including the cytology of cancer, "some early studies in exact measurement of cardiac function," and later research on blood pressure: Obituary, "William Russell," *Lancet*, 1940, *2*: 251; E. B., obituary, "William Russell," *Brit. Med. J.*, 1940, *2*: 269. Rather, it would seem that Russell, like many of his contemporaries, took the view that new laboratory-based diagnostic tests should not take precedence over the clinician's more holistic view of the clinical situation. Like Rainy, he coauthored a textbook on clinical methods: G. A. Gibson and William Russell, *Physical Diagnosis: A Guide to Methods of Clinical Investigation* (Edinburgh: Pentland, 1890), which ran to three editions. Gibson was another keen advocate of new physiologically informed methods of clinical investigation, and established an electrocardiography laboratory in the Royal Infirmary in 1911.

82. Editorial, "Clinical Methods," *Edinburgh Med. J.*, 1913, n.s., *11*: 481–82, at p. 481 (emphasis added).

the practitioner to see beyond mere signs and symptoms to a deeper understanding of the disease processes occurring in any particular case. "Method," then, was what distinguished a properly critical hermeneutics of clinical investigation from mere "rule of thumb" semiology.

Edinburgh medical teachers tended to identify "method" with the kind of scientifically informed approach to clinical practice that they saw as central to the traditions of the Edinburgh school. Speaking in 1919, for instance, the professor of clinical medicine traced this tradition back to John Hughes Bennett, the mid-nineteenth-century professor of the institutes of medicine: "As a clinical teacher the leading idea in his [Bennett's] mind seems to have been to teach the student *method*."[83] Lorrain Smith had himself learned the virtues of "method" while taking Greenfield's course of clinical diagnosis during the late 1880s. Writing to a student friend, he declared himself unimpressed by Greenfield's "ideas of clinical experience and his methods of examin[ation]," but he took a far more favorable view of "his method of approaching a case mentally," considering it "the main point in his teaching"; he concluded that Greenfield "is unique in the mental attitude he makes one assume of scepticism."[84] He elaborated on this view some thirty years later, in an appreciation he wrote for Greenfield's obituary. What had impressed him above all about Greenfield's clinical teaching was the way he critically evaluated all the various sources of information available to him.[85] This was precisely the attitude that Lorrain Smith sought to inculcate in his own pathology teaching.

While the aims behind Lorrain Smith's pathology teaching were continuous with those of his Edinburgh predecessors, the pedagogy he employed was distinctly novel. The case method of teaching pathology closed the gap between clinical and postmortem examination, and so placed pathological observations on an equal footing with clinical observations. At the same time, it also made it possible for students to begin

83. Francis Darby Boyd, "An Inaugural Lecture in the Moncreiff Arnot Chair of Clinical Medicine," *Edinburgh Med. J.*, 1919, n.s., *23*: 284–95, at p. 290 (emphasis in original). Criticized in his own time for his overinsistence on the importance of laboratory knowledge as a guide to understanding disease, Bennett had by the 1910s become something of an exemplar of the scientific practitioner for Edinburgh doctors. Boyd was also editor of the third (1902) edition of Gibson and Russell's *Physical Diagnosis*.

84. Lorrain Smith to J. T. Wilson, 19 March 1889, J. T. Wilson Papers, University Archives, University of Sydney, Sydney, Australia. I am grateful to Patricia Morison for bringing these papers to my attention.

85. "William Smith Greenfield" (n. 6), appreciation by J. Lorrain Smith, p. 258. Greenfield's clinical teaching concentrated on the practice of diagnosis, but like Lorrain Smith after him he regarded this as less a matter of classifying a case than of understanding "the development and advance of disease": H. R., "Professor W. S. Greenfield" (n. 6), p. 258.

practicing clinico-pathological correlation for themselves at a much earlier stage of their medical education than had hitherto been possible. Since the case method of teaching dealt with patient records and specimens rather than actual patients, students could practice making sense of such cases well before assuming any clinical responsibility for patients. Once they moved on to the hospital wards, even their earliest dealings with patients would be informed by a prior appreciation of the clinico-pathological point of view.

Conclusion

Lorrain Smith's case method of pathology teaching was not the only case-based innovation in medical pedagogy of the early twentieth century. Others were looking for ways in which clinical education, in particular, could become more scientific by adopting a more systematic approach to cases. For instance, Clifford Allbutt, professor of medicine at Cambridge and a notable advocate of reform in clinical teaching, declared around this time that "lectures in medicine must become more and more conferences, each conducted in reference to 'Cases' of disease, in other words, clinical lectures in a hospital."[86] But perhaps the best-known innovation in case-based teaching of this period occurred at Harvard, where in 1906 the physician Richard Cabot introduced what would become known as the clinico-pathological conference—a case-based method of instruction that likewise brought together clinical and pathological perspectives, and that quickly acquired canonical status within American medical education.[87]

I have found no evidence that Lorrain Smith was aware of Cabot's approach to cases, though it is perfectly possible that he was. Whether he knew of it or not, however, the way that the case method of teaching was developed in Edinburgh diverged in subtle but significant ways from the Harvard model. Cabot's clinico-pathological conferences remained much closer, in the kind of epistemology they embodied, to the way that

86. Quoted in Weatherall, *Gentlemen, Scientists* (n. 9), pp. 189–90.

87. A case-based approach to clinical teaching was first suggested in 1900 by W. B. Cannon, at that time still a medical student at Harvard, before being adopted by Richard Cabot and other clinical teachers there: Saul Benison, A. Clifford Barger, and Elin L. Wolfe, *Walter B. Cannon: The Life and Times of a Young Scientist* (Cambridge: Belknap Press of Harvard University Press, 1987), pp. 65–70, 107, 233. For discussions of the epistemological and pedagogical basis of Cabot's conferences see, inter alia, John Forrester, "If *p* then What? Thinking in Cases," *Hist. Hum. Sci.*, 1996, *9*: 1–25; Stanley Joel Reiser, "Creating Form out of Mass: The Development of the Medical Record," in *Tradition and Transformation in the Sciences: Essays in Honor of I. Bernard Cohen*, ed. Everett Mendelsohn (Cambridge: Cambridge University Press, 1984), pp. 303–16; Maulitz, "Pathology" (n. 9).

previous generations of clinical teachers had used cases. Thus while both clinical and pathological observations were considered in his conferences, they continued to be presented sequentially, with Cabot discussing the clinical aspects of the case before the pathologist revealed the underlying morbid processes. Moreover, Cabot's overriding concern continued to be to reach a diagnosis, while the pathologist's role was to confirm or correct the inferences that Cabot drew from his clinical observations.[88] In this respect, Cabot's conferences enacted and represented quite distinct roles and spheres of authority for the clinician and the pathologist. As Russell Maulitz puts it: "by setting forth the canons of diagnostic proof in pathological terms, Cannon and Cabot, in the most formal manner possible, were also crystalising the clear-cut, separate relations between the pathologist and the clinician."[89]

As we have seen, Lorrain Smith's case method of teaching pathology epitomized a rather different relationship between clinician and pathologist, and a rather different role for pathology in clinical practice. Despite their very different occupational identities and fields of professional expertise, the clinician and the pathologist met in the classroom as co-workers seeking a mutual understanding of the case before them. In pursuing such an understanding, they sought to exemplify, not the "canons of diagnostic proof" that Maulitz attributes to Cabot, but rather the canons of "method" as understood in the Edinburgh medical school. Here, diagnostic categorization was secondary to a concern to construct as full a clinico-pathological narrative of each case as possible. Finally, as a pedagogical device, the case method of teaching pathology was less concerned with showcasing the diagnostic and investigative skills of consultant clinicians and professional pathologists than with training medical students to practice sound clinico-pathological "method" for themselves. "Method," in this sense, was as important for general practitioners, examining patients with only the minimum of investigative aids, as for consultants and pathologists with all the resources of a university teaching hospital at their disposal. In exemplifying "method," Lorrain Smith's case method of teaching pathology tended to blur precisely the occupational and epistemological distinctions that Cabot's clinico-pathological conferences tended to reinforce, and to exemplify instead the way that all

88. Christopher Crenner, "Diagnosis and Authority in the Early Twentieth-Century Medical Practice of Richard C. Cabot," *Bull. Hist. Med.*, 2002, *76*: 30–55, at pp. 37–40. The rather ambiguous role of pathology and diagnosis in Cabot's practice and his professional identity is further explored in Crenner, *Private Practice: In the Early Twentieth-Century Medical Office of Dr. Richard Cabot* (Baltimore: Johns Hopkins University Press, 2005).

89. Maulitz, "Pathological Tradition" (n. 9), p. 188.

medical practitioners—be they professional pathologists, hospital consultants, or the lowliest of general practitioners—should bring both clinical and pathological perspectives to bear in their own practice.

The differences between Lorrain Smith's and Cabot's approach to cases was not lost on the dean of the Harvard Medical School, David Edsall, when he visited Edinburgh in 1922 as part of a Rockefeller-sponsored tour to study clinical teaching methods in Britain. Observing the "interesting method of teaching special pathology, devised by Professor Lorrain Smith, and now used by him in Edinburgh and by some departments elsewhere," he added:

> It would seem to me that with us the method might be useful at a later period in the course, as an elaboration of pathology in connection with the clinical work and that it might be easy, possibly to use the beneficial features of it in, for example, modifications of the clinico-pathological exercises which are often used in this country.[90]

Ironically, Edsall's favorable comments on Lorrain Smith's teaching appear to have made little impression on the Rockefeller Foundation officers, who at the time he visited were viewing Edinburgh as a possible site for intervention. Christopher Lawrence has shown how, shortly after Edsall reported on his trip to Britain, Richard Pearce, the Foundation's director of medical education, began pushing his own ideas of how scientific medicine should develop in the Scottish capital. Pearce had little time for the kind of collaboration between laboratory scientists and part-time hospital consultants that Lorrain Smith's teaching exemplified, and was blind to any scientific or educational benefits that Edsall and others might see in such collaboration. Instead, he channeled Rockefeller resources into full-time clinical professorships and laboratories, while deliberately marginalizing Lorrain Smith and his clinical colleagues.[91]

90. Edsall, "Comparative Observations" (n. 36), pp. 29–30. Edsall was generally unimpressed with what he found in the British schools, but commended Lorrain Smith's case method of teaching to the Rockefeller officers as "interesting and suggestive": Edsall to Richard M. Pearce, 18 October 1922, folder 217, box 16, ser. 401, RG 1.1, Rockefeller Foundation Archives, RAC.

91. Lawrence, *Rockefeller Money* (n. 22), esp. pp. 110–21, 141–43. As Regius Professor of clinical surgery from 1919, Sir Harold Stiles, who had contributed to the case method of teaching pathology—including a discussion of one of the exemplary cases published in the *Edinburgh Medical Journal* (see above, n. 42)—was one of the main mediators between the Medical Faculty and the Rockefeller Foundation. He never quite secured Pearce's trust in the way that some of the full-time scientific members of the faculty did, and he confirmed Pearce's doubts when he declined to be promoted to a new Rockefeller-funded full-time chair of surgery in 1925.

In the event, Pearce's schemes were only partially successful. By the 1930s, clinicians who shared Lorrain Smith's vision of collaborative medicine had risen to positions of prominence within the Edinburgh medical school.[92] In 1932, Lorrain Smith was succeeded in the chair of pathology by Alexander Murray Drennan, who had himself contributed a number of exemplary cases to the morbid and applied pathology course, and who carried Lorrain Smith's methods forward into the postwar years.[93] Meanwhile, as Edsall had observed, the case method of teaching pathology was also being adopted "by some departments elsewhere."[94] In Manchester, a major reorganization of the medical curriculum was undertaken in the years after the First World War. As part of that reorganization, H. R. Dean, who had been appointed to the chair of pathology in 1915, revived the case method of teaching that Lorrain Smith had inaugurated there in the prewar years.[95] Dean was assisted in this endeavor by a junior lecturer, J. H. Dible, who in 1937 would become professor of pathology at the Royal Postgraduate School of Medicine, based in the Hammersmith Hospital. There Dible played a major role in developing what his obituarists called "the Clinico-pathological Conferences that have become a model for the whole world of pathology."[96]

How far this latter initiative in case-based teaching resembled Lorrain Smith's original case method of teaching pathology, or indeed whether it had more in common with Cabot's approach to clinico-pathological conferences, is impossible to tell without further research. While we might trace a fairly direct descent from Lorrain Smith to Dible, Dible's educational methods were doubtless adapted to the particular institutional, medical, and scientific circumstances in which he found himself. We cannot assume that he even conceptualized cases, let alone used them for teaching purposes, in the same way as his predecessors. Nonetheless, the superficial continuities are suggestive.

So too are the similarities between these earlier educational initiatives and the more recent expansion of case-based methods associated with the

92. Most obviously David Murray Lyon, another contributor to the case method of teaching pathology, who became professor of therapeutics (a clinical post, with beds in the infirmary) in 1924, then of clinical medicine in 1935: obituary, "David Murray Lyon," *Brit. Med. J.*, 1956, *2*: 1309–10; obituary, "David Murray Lyon," *Lancet*, 1956, *271*: 1167–68.

93. Obituary, "A. M. Drennan," *Brit. Med. J.*, 1984, *288*: 1464.

94. Edsall, "Comparative Observations" (n. 36), pp. 29–30.

95. J. Henry Dible, "Henry Roy Dean 19th February 1879–13th February 1961," *J. Pathol. Bacteriol.*, 1962, *83*: 587–97, at p. 590.

96. J. Mills et al., "James Henry Dible 29 October 1889–1 July 1971," *J. Pathol. Bacteriol.*, 1973, *111*: 65–76, at p. 67.

spread of so-called problem-based learning. Recent advocates of problem-based learning highlight many of the same virtues that Lorrain Smith and his colleagues attributed to the case method of teaching pathology, including the inculcation of what are now called "generic competencies," the superiority of "deep learning" over rote knowledge, the value of concrete problem-solving exercises as a means of integrating different elements of the curriculum, and exemplification of the benefits of teamwork.[97] Plainly the question of how best to train doctors to think scientifically about the problems they will encounter in medical practice is a perennial one that was not definitively solved by the rise of Rockefeller-style scientific medicine. Case-based teaching and clinically oriented problem-solving are still seen to offer ways of articulating the relationship between medical science and medical practice that have not so far been replicated with any success in the didactic lecture or the discipline-based laboratory. Historians surely have much to learn from exploring the development of this distinctive form of medical pedagogy.

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97. See, e.g., Diana F. Wood, "Problem Based Learning," *Brit. Med. J.*, 2003, *326*: 328–30.